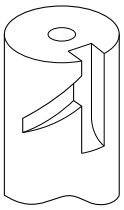
Service Information

ADJUSTMENT PROCEDURES FOR RSV TYPE HYBRID (CAM LOCK) GOVERNOR EQUIPPED INJECTION PUMP FOR KOMATSU

Adjustment procedures are now available for the RSV type hybrid (cam lock) governor equipped injection pump for Komatsu assembled with load plungers. The details are described below.
Also refer to service information bulletin S.I. 327.

1. PLUNGER OUTLINE

Plungers are lower helix or upper and lower helix types. The upper and lower helix type plungers may be further divided into load plunger and starting advance type plungers. The adjustment procedures described in this bulletin are for low load advance type load plungers.

<table>
<tr><td rowspan="2">Lower helix plungers</td><td colspan="2">Upper and lower helix plungers</td></tr>
<tr><td>Load plungers</td><td>Starting advance plungers</td></tr>
<tr><td rowspan="2"> 
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 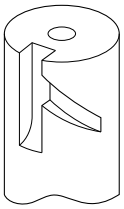
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 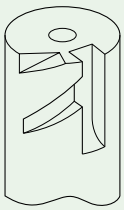
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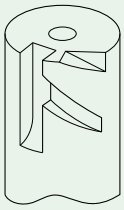
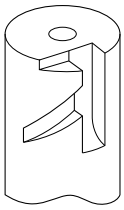
 
Left helix</td><td rowspan="2"> 
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 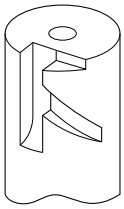
Left helix</td></tr>
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 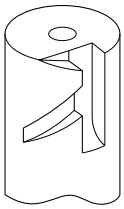
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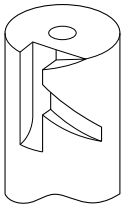
 
Left helix</td></tr>
</table>

2. ADJUSTMENT OUTLINE

Preparation ···
- Install the injection pump on the pump test bench.
- Remove the governor cover.
- Attach the control rack position measuring device to the injection pump.
- Remove the flyweight and then reinstall it loosely to the camshaft so that it turns freely.
- Align the flyweight pointer and the clamp groove.

Cam lock mechanism adjustment ··· Perform the following in accordance with the calibration data.
- Set the No. 1 cylinder's cam lift at 'h mm' and then set the camshaft 'θ°' from the 'h mm' position.
- In the above position fix the flyweight and remove the clamp.

⚠ CAUTION

Always confirm that the clamp has been removed.
Operating the injection pump without removing the clamp can cause serious injury and damage the governor.

Fuel injection quantity adjustment ··· Measure and adjust the fuel injection quantity in accordance with the calibration data.

When fuel injection quantity has been readjusted

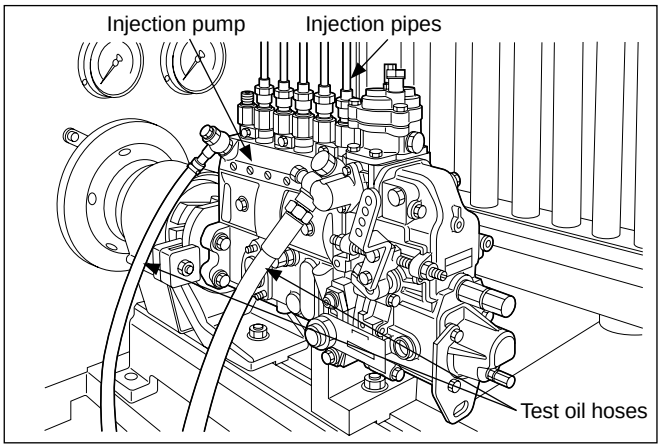
Injection timing adjustment ··· After adjusting the fuel injection quantity, adjust the injection timing in accordance with the calibration data.

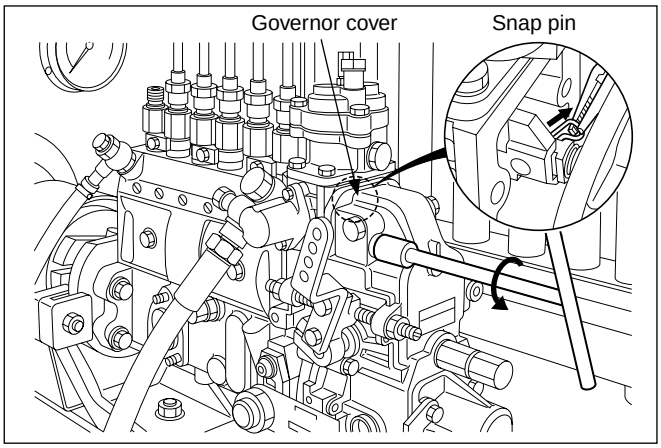
Fuel injection quantity confirmation ··· Confirm the fuel injection quantity in accordance with the calibration data.

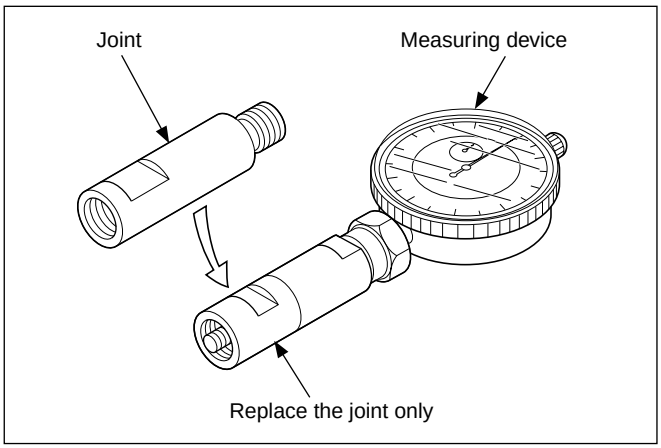
Advice
When the fuel injection quantity has been adjusted, adjust the injection timing until it is as specified in the calibration data and confirm the fuel injection quantity.

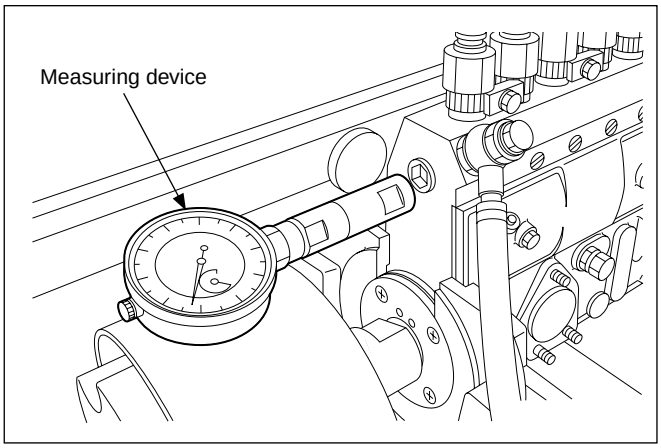
Governor adjustment ··· Adjust the governor in accordance with the calibration data.

Setting the lock pin ··· Align the flyweight pointer and the lock pin groove, insert the lock pin and then fix using the plug.









3. ADJUSTMENT OUTLINE

[1] Preparation

(1) Attach the injection pump to the pump test bench.

(2) Attach the test nozzle and nozzle holder assembly, the injection pipes (except for the No 1 cylinder's injection pipe), and the test oil hoses to the injection pump.

Advice

Refer to the calibration data and the service manual 'PE(S)-A Type Injection Pump, Repair and Maintenance (Publication No. EE11E-11151)' for details.

(3) Remove the governor cover.

Advice

- **Refer to the service manual 'RSV Type Governor, Construction and Operation, Repair and Maintenance (Publication No. EE13E-11021)' for details.**
- **Remove the snap pin from the control rack connection and then remove the link.**

(4) Replace the measuring device joint.

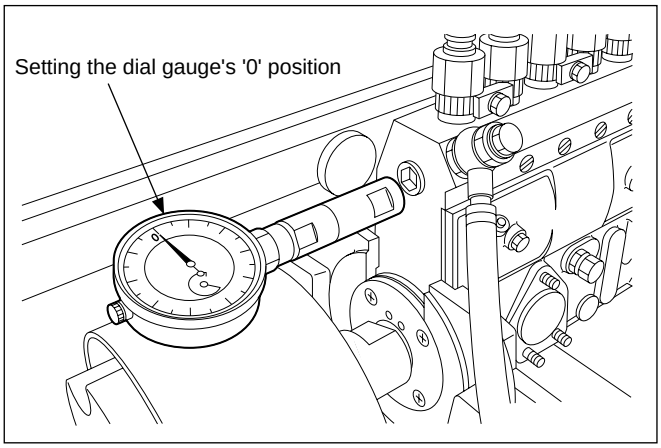
Advice

Because this injection pump's control rack is short, replace the measuring device joint with the joint listed below.

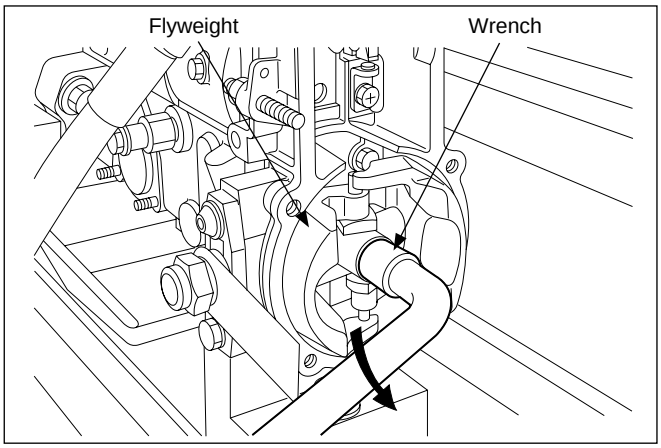
Tool name	Part no	Remarks
Joint	157845-5600 (9 681 610 612)	
Measuring device	105782-6180 (9 680 610 144)	

Note:
All Bosch part numbers are shown in brackets below RBAJ part numbers.

(5) Attach the measuring device to the injection pump.



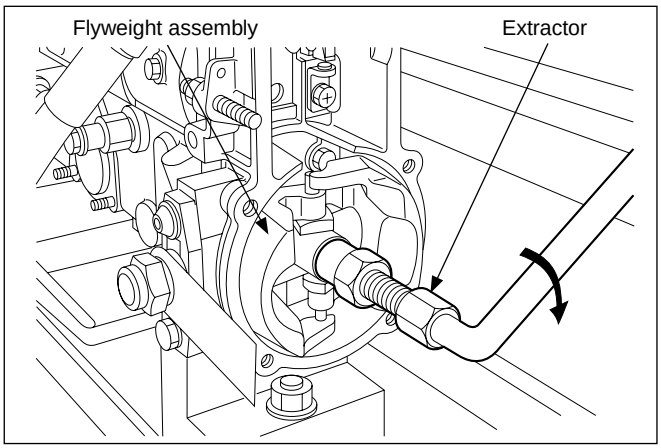
(6) Push the control rack against the governor side and zero the measuring device's dial gauge.



(7) Remove the roundnut fixing the flyweight using the wrench.

Tool name	Part no	Remarks
Wrench	157915-0100 (0 986 613 026)	

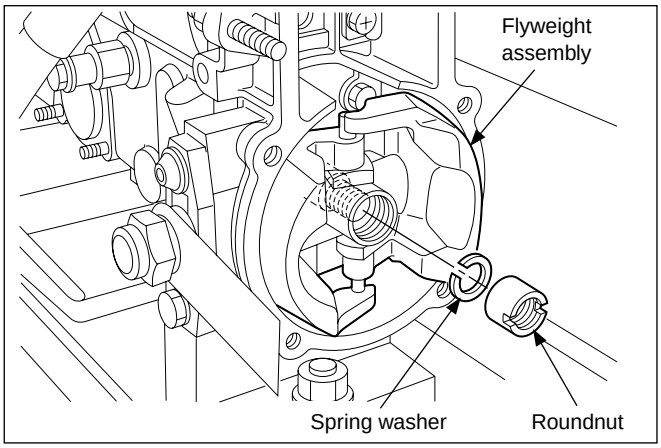
Advice
Fix the pump test bench's flywheel using the lever so that it will not rotate.



(8) Attach the extractor to the flyweight holder and remove the flyweight assembly.

Tool name	Part no	Remarks
Extractor	157926-9320 (9 681 610 403)	M20x1.5

Advice
Fix the pump test bench's flywheel using the lever so that it will not rotate.

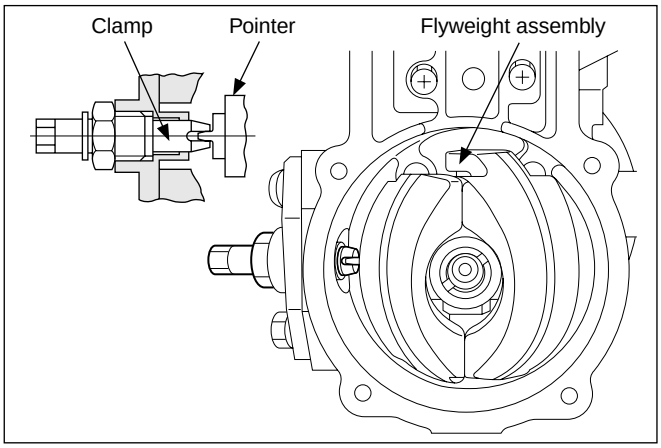


(9) Loosely assemble the flyweight assembly to the camshaft so that it rotates freely.

Note:
The camshaft and flyweight do not have key grooves.

(10) Temporarily fix the spring washer and the roundnut to the flyweight.

Advice
Reconfirm that the flyweight rotates freely.



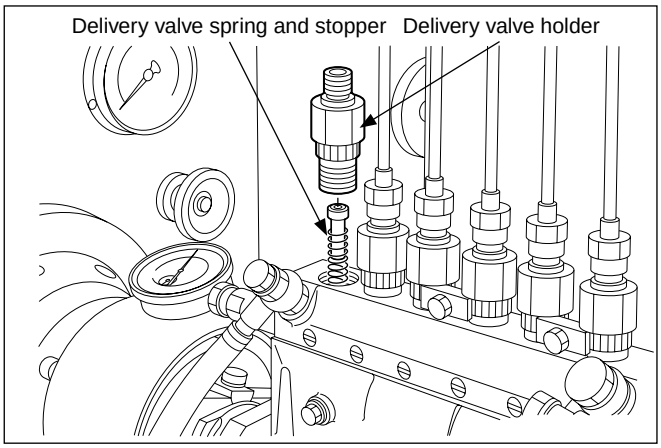
(11) With the flyweight assembly fixed temporarily as described in procedure (9) on the previous page, position the pointer horizontally and assemble the clamp's groove to the pointer.

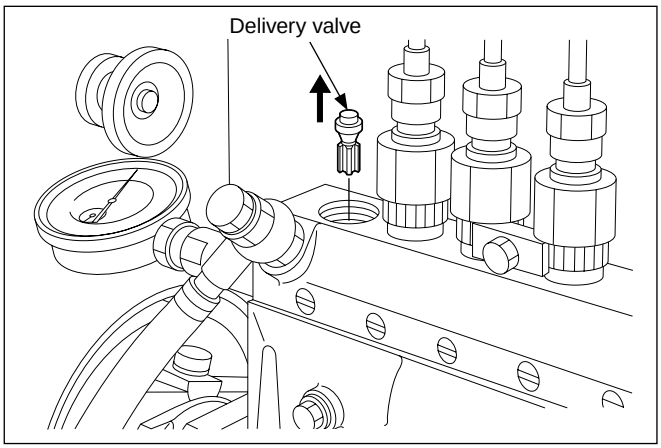
Tool name	Part no	Remarks
Clamp	157927-1620 (9 443 613 006)	

Advice
When assembling the clamp's groove to the pointer, this clamp must be used. Do not use the lock pin (ie, the original part) as the pin's tooth may be damaged.

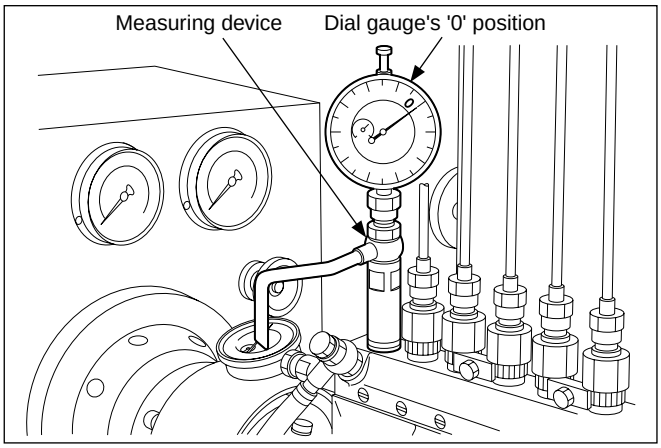
[2] Cam lock mechanism adjustment

(1) Remove the No. 1 cylinder's delivery valve holder (refer to the calibration data).
(2) Remove the delivery valve spring and the delivery valve stopper.





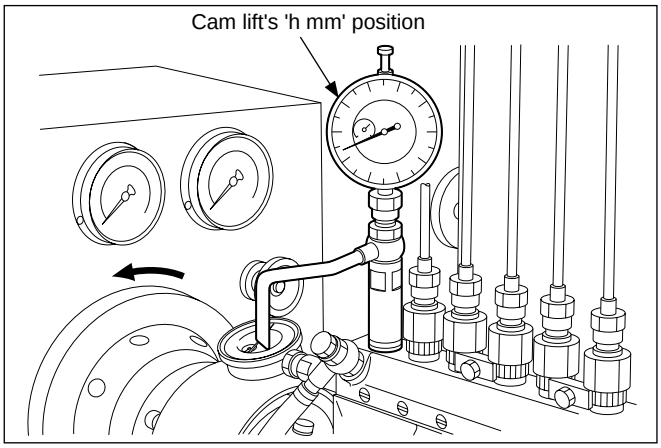
(3) Remove the delivery valve itself.
Advice
Because the delivery valve is a precision part, store it so that it is not damaged.



(4) Install the measuring device.

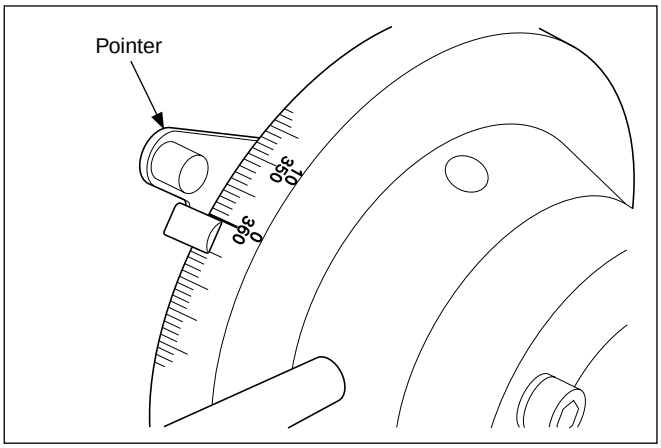
Tool name	Part no	Remarks
Measuring device	105782-4330 (9 680 610 018)	

(5) Position the No. 1 cylinder's plunger in the bottom dead center position and zero the measuring device's dial gauge.

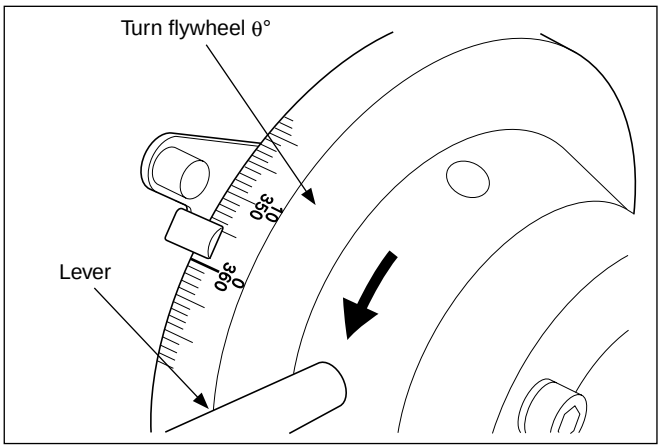


(6) Turn the pump test bench's flywheel in the specified direction of rotation using the lever and set the No. 1 cylinder's cam lift at 'h mm' (refer to the calibration data).

Note:
- The control rack can be in any position.
- It is not necessary to apply pump test bench oil delivery pressure.



(7) At the 'h mm' position set in procedure (6) above, set the pump test bench's flywheel pointer at '0' or at any position where '100°' markings can be easily read.

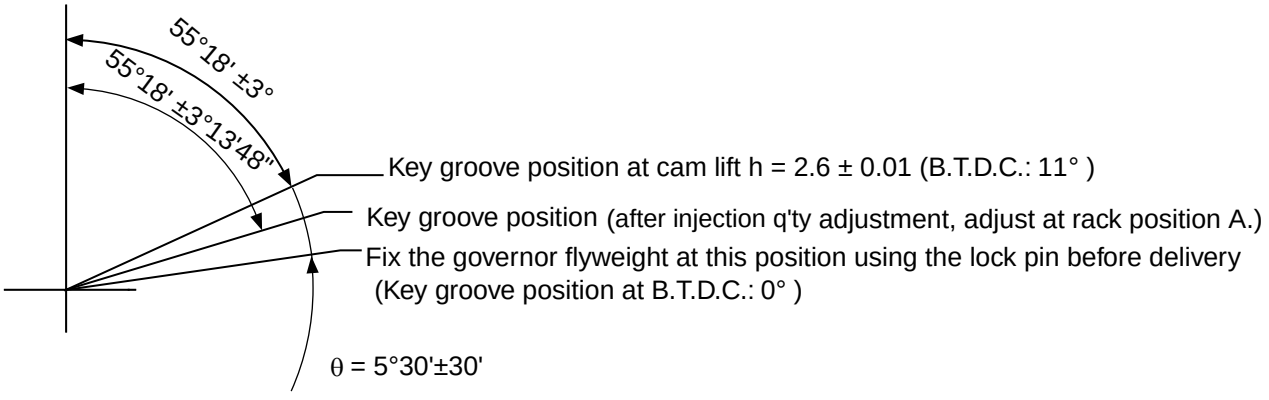


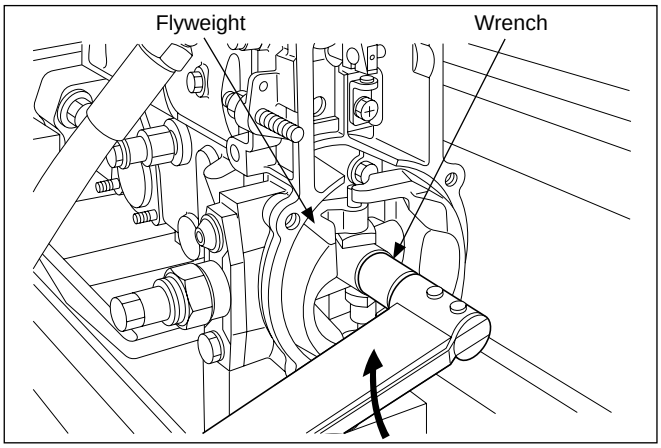
(8) Turn the flywheel 'θ°' in the specified direction of rotation (refer to the calibration data).

⚠ CAUTION

Remove the lever after operating the flywheel.
Operating the test bench without removing the lever can cause serious injury and damage the test bench.

Example of calibration data sheet's timing indication

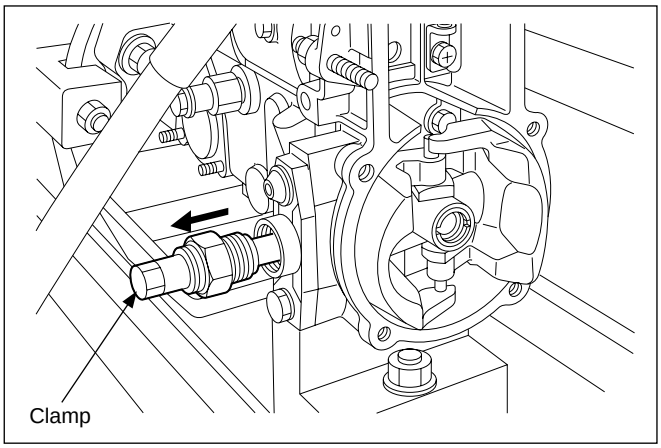

55°18' ±3°
55°18' ±3°13'48"
Key groove position at cam lift h = 2.6 ± 0.01 (B.T.D.C.: 11°)
Key groove position (after injection q'ty adjustment, adjust at rack position A.)
Fix the governor flyweight at this position using the lock pin before delivery
(Key groove position at B.T.D.C.: 0°)
θ = 5°30'±30'



(9) Fix the flyweight to the camshaft in the 'θ°' position set in procedure (8) on the previous page.

Specified torque:
M14 59 ~ 69 N·m {6 ~ 7 kgf·m}
M12 49 ~ 59 N·m {5 ~ 6 kgf·m}

Advice
Fix the pump test bench's flywheel using the lever so that it will not rotate.

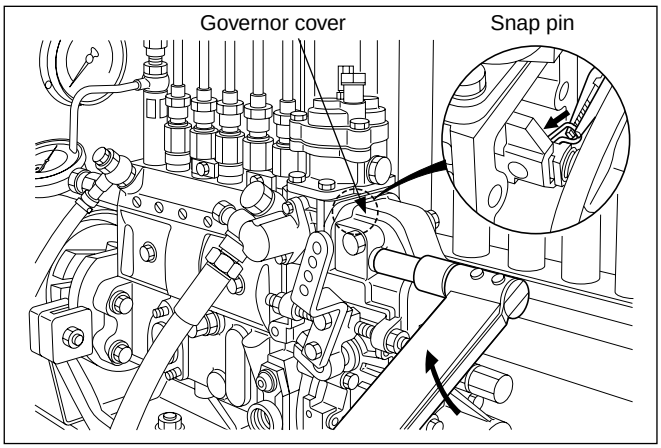


(10) Remove the clamp.

Advice
After tightening the flyweight locknut, confirm that the clamp can be inserted smoothly onto the pointer at the specified plunger position [see procedure (9) above]. (Flyweight pointer position confirmation)

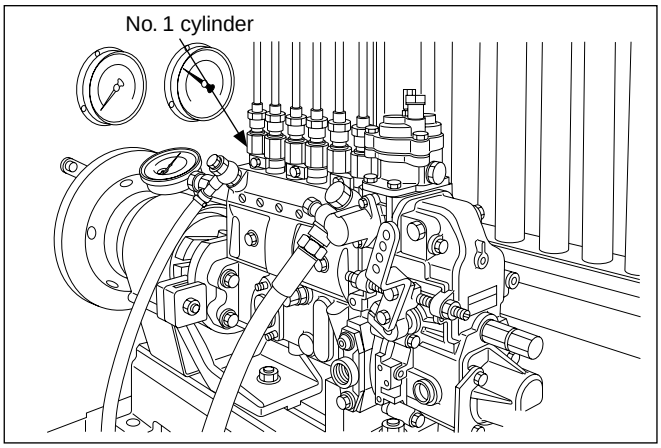
⚠ CAUTION

Always confirm that the clamp has been removed.
Operating the injection pump without removing the clamp can cause serious injury and damage the pump.



(11) Assemble the link to the control rack and attach the snap pin.
(12) Reinstall the governor cover in its original position.

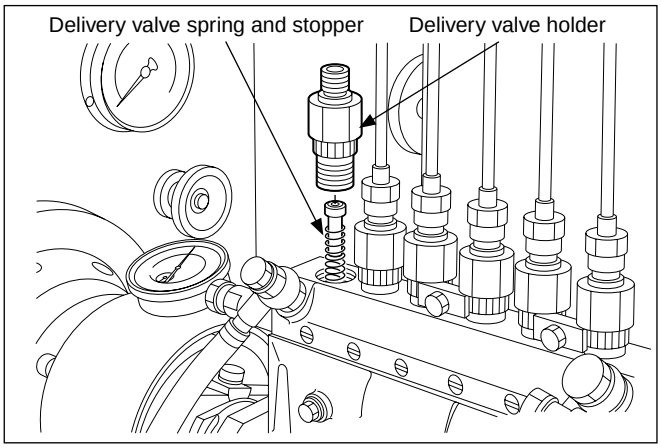
Advice
Refer to the service manual 'RSV Type Governor, Construction and Operation, Repair and Maintenance (Publication No. EE13E-11021)' for details.



[3] Fuel injection quantity adjustment

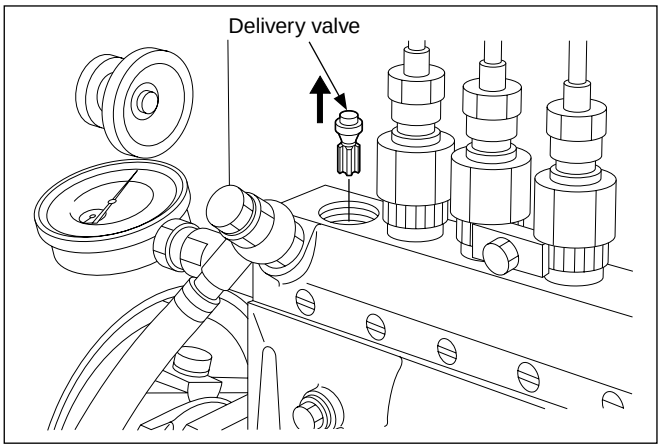
(1) Reinstall the No. 1 cylinder's delivery valve, delivery valve stopper, delivery valve spring and delivery valve holder, and connect the injection pipe.
(2) Reconfirm that the control rack measuring device's dial gauge is in the '0' position.
(3) Measure the fuel injection quantity and adjust it so that it is as specified in the calibration data.

Advice
Refer to the 'PE(S)-A Type Injection Pump, Repair and Maintenance (Publication No. EE11E-11151)' for details.

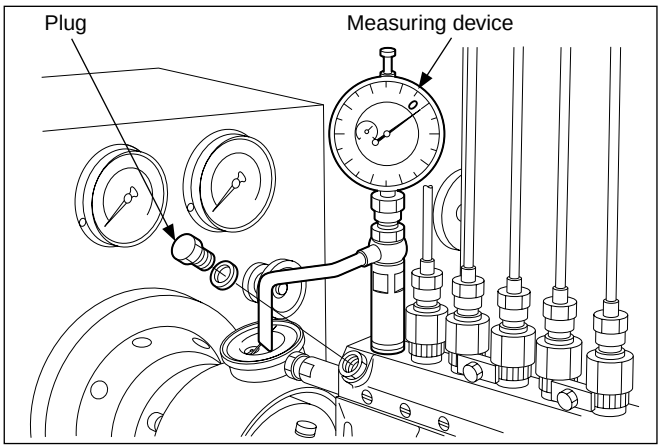


[4] Injection timing adjustment

(1) Remove the No. 1 cylinder's injection pipe (refer to the calibration data).
(2) Remove the delivery valve holder.
(3) Remove the delivery valve spring and the delivery valve stopper.



(4) Remove the delivery valve itself.

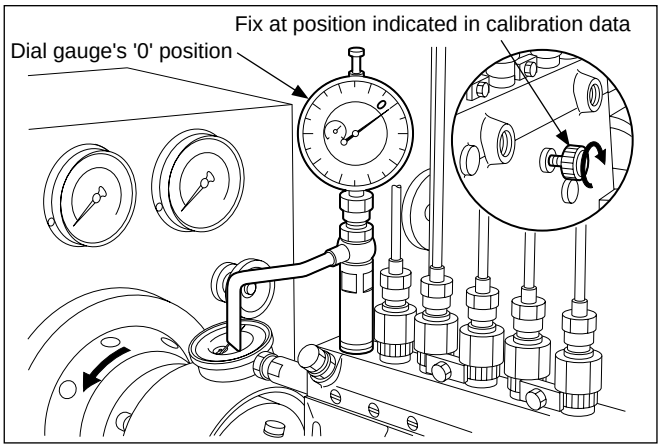


(5) Install the measuring device.

Tool name	Part no	Remarks
Measuring device	105782-4330 (9 680 610 018)	

(6) Remove the overflow valve and install the plug.

Tool name	Part no	Remarks
Plug	029111-4050 (9 442 610 325)	

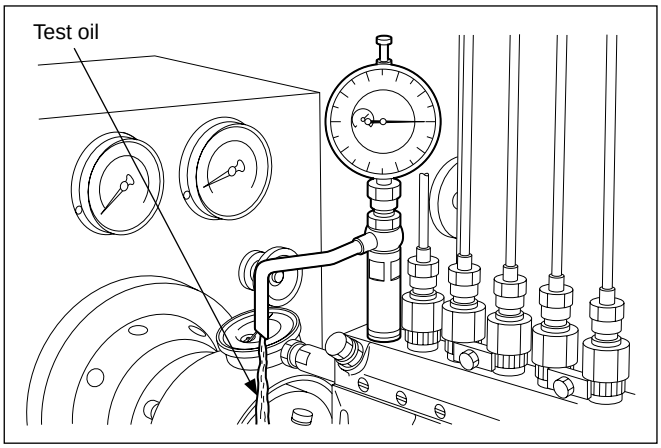


(7) Fix the control rack in the position specified in the calibration data (the example below is 9.1 mm).

Example:
Pre-stroke: No. 1 cylinder 2.6±0.05 mm lift
(After injection quantity adjustment, adjust at a rack position of 9.1 mm.)

(8) Turn the pump test bench flywheel in the specified direction of rotation and position the No. 1 cylinder's plunger in the bottom dead center position.
(9) Zero the pre-stroke measuring device's dial gauge.

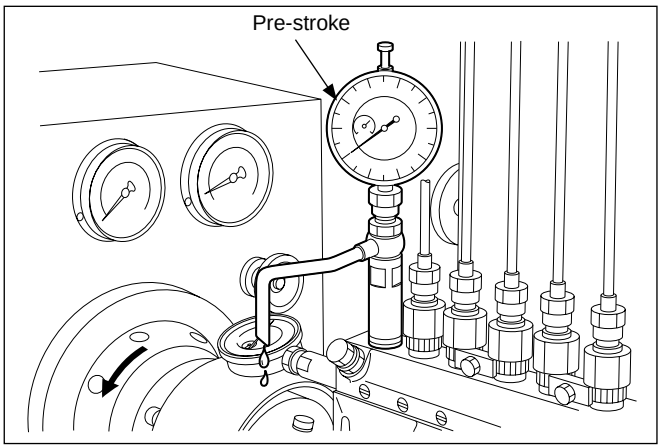
Note:
When adjusting the injection timing, a large quantity of test oil will flow from the measuring device's spill pipe when the test bench is switched ON when the plunger lift is small. To prevent this, it is better to have the camshaft lift at approximately 0.5 mm before the specified pre-stroke position (ie, at approximately 2.1 mm in the previous example).



(10) Switch the pump test bench ON and adjust the test oil supply pressure to approx 20 kPa {0.2 kgf/cm^2} using the adjusting valve.

Advice

- **Operate only the pump test bench test oil supply pressure. Do not operate the injection pump.**
- **Test oil will flow from the measuring device's spill pipe. Prepare a container.**

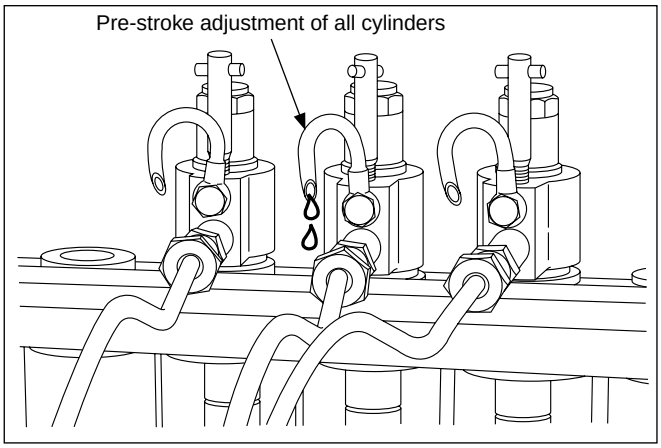


(11) Turn the pump test bench's flywheel in the specified direction (refer to the calibration data) and measure the pre-stroke from the dial gauge when test oil stops flowing from the measuring device spill pipe.

Note:
Test oil has stopped flowing when only 2 ~ 3 drops of oil per second drip from the spill pipe.

Advice

Confirm that no test oil leaks onto the outside of the injection pump.

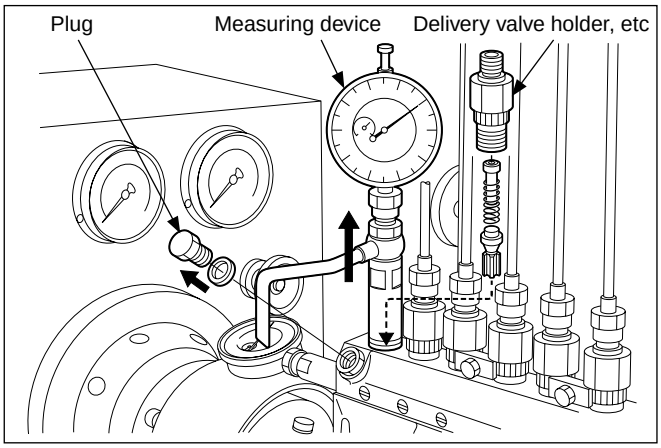


(12) If pre-stroke in procedure (11) above is not as specified, adjust until it is as specified.

(13) Adjust the remainder of the cylinders in the order of injection.

Advice

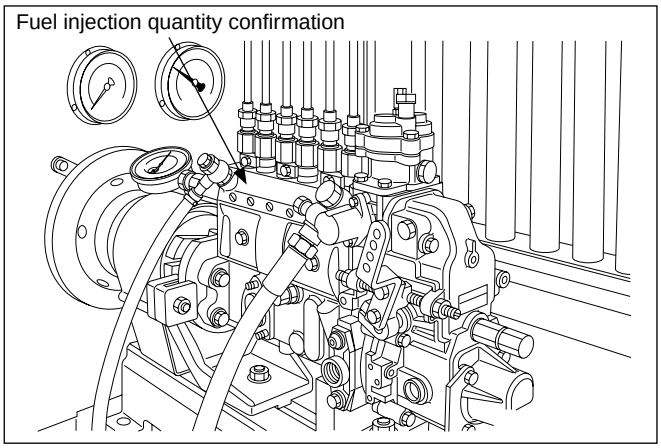
Refer to the service manual 'PE(S)-A Type Injection Pump, Repair and Maintenance (Publication No. EE11E-11151)' for details.



(14) After the injection timing of all cylinders has been adjusted, remove the measuring device and the plug from the No. 1 cylinder.
(15) Reinstall the delivery valve, delivery valve spring, etc, and then reinstall the injection pipe and the test oil hoses in their original positions.

Advice

Refer to the service manual 'PE(S)-A Type Injection Pump, Repair and Maintenance (Publication No. EE11E-11151)' for details.

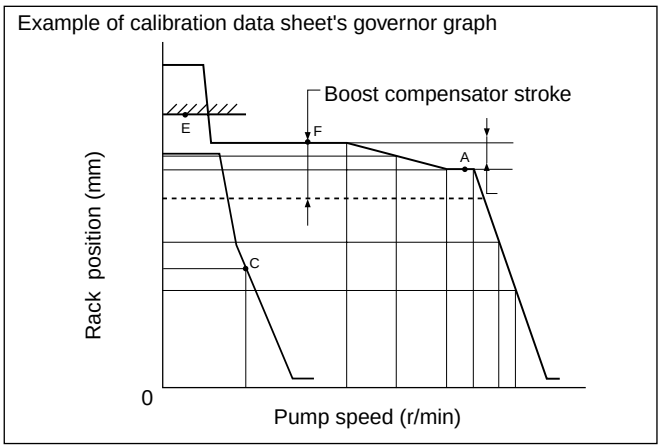


[5] Fuel injection quantity confirmation

(1) Measure the injection quantities as described in the calibration data and confirm that they are as specified.
(2) If the injection quantities are not as specified, readjust.

Advice

When the injection quantities are readjusted, repeat [4] 'Injection timing adjustment' and then [5] 'Fuel injection quantity confirmation' until the specified calibration data values are satisfied.



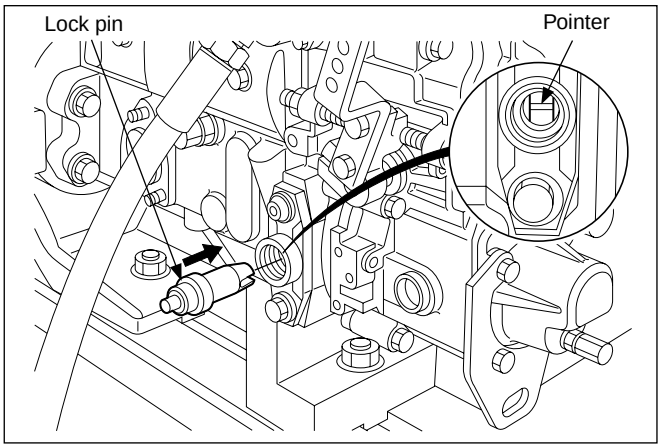
[6] Governor adjustment

Adjust the governor as described in the calibration data.

Advice

Refer to the service manual 'RSV Type Governor, Construction and Operation, Repair and Maintenance (Publication No. EE13E-11021)' for details.

If equipped with a boost compensator, refer to service information bulletin S.I. 327.



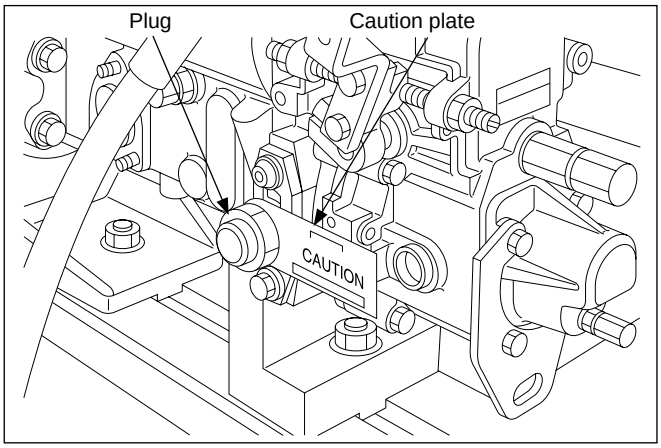
[7] Setting the lock pin

(1) After completing adjustment, turn the flywheel lever to position the flyweight assembly's pointer horizontally.

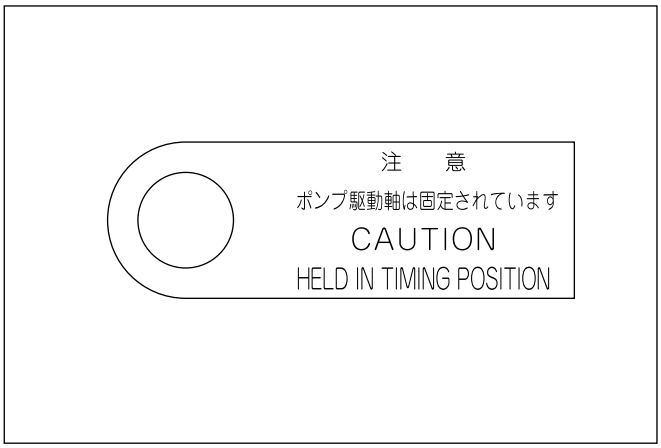
Note:

Check through the plug's hole to confirm that the pointer is horizontal.

(2) Disconnect the injection pump from the pump test bench's drive coupling and disassemble the coupling from the pump.
(3) Align the lock pin groove (original part) with the pointer and then securely assemble the lock pin to the pointer.



(4) Assemble the caution plate to the plug and install the plug to the governor housing.



- Caution plate